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SPRING 1981

Big Sky

Clearwater

VOL. XI

SPRING ISSUE 1981

No. 1



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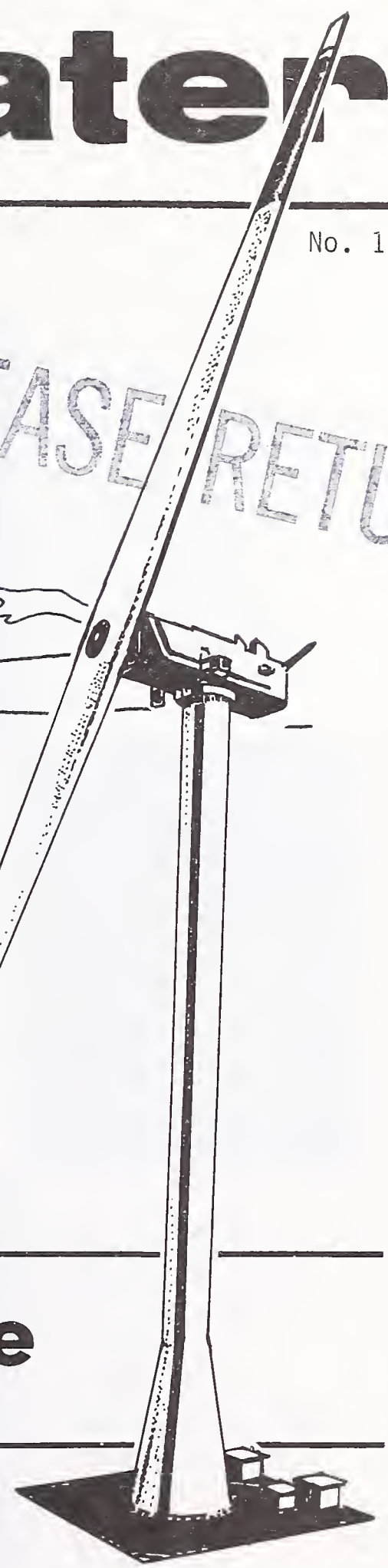
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It's no longer an ill wind
that blows
from the sewage plant

See story on Page 5

Annual Conference Issue

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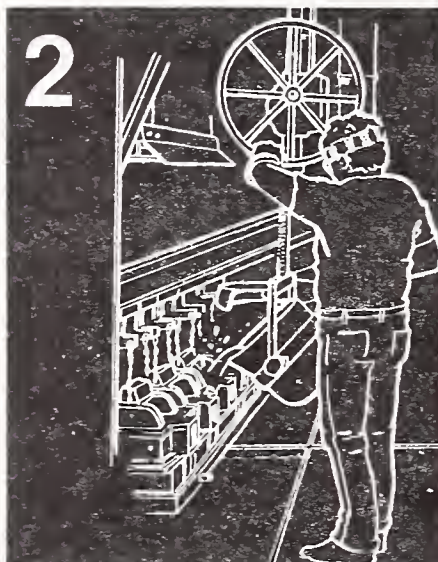
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Step by Step

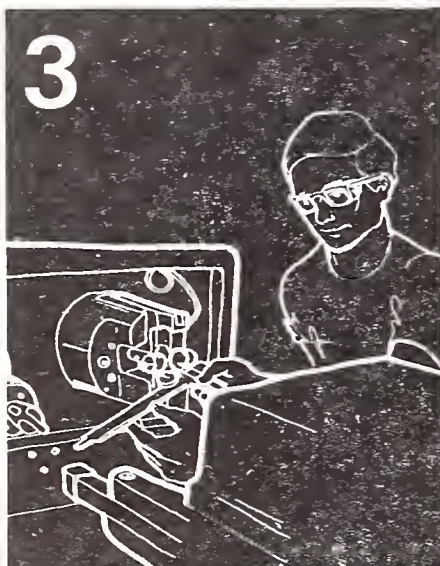
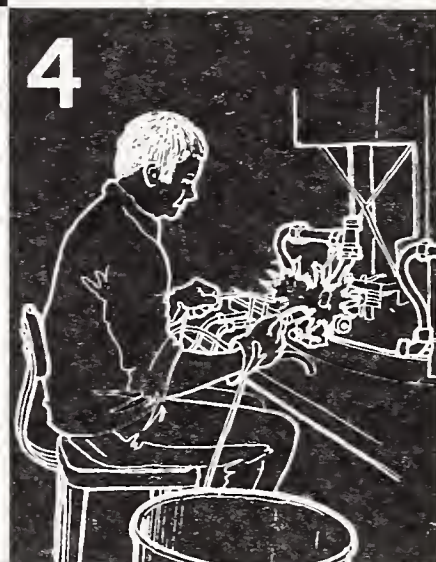


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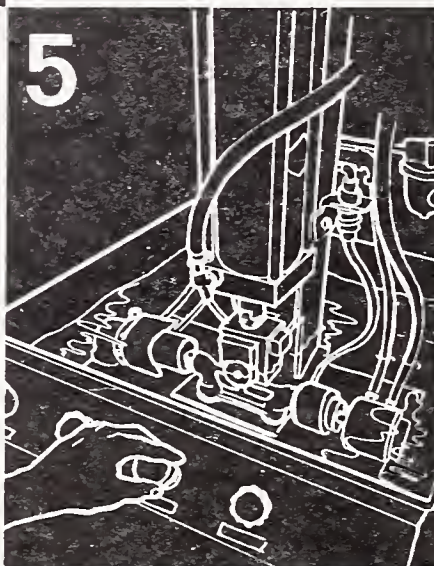
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Conference to be in a "copper" setting

MSAWWA and MWPCA to meet jointly in Butte

THE JOINT CONFERENCE of the Montana Section of the American Water Works Association (MSAWWA) and the Montana Water Pollution Control Association (MWPCA) will be held on

March 26-27 at the Copper King Inn in Butte.

This year's conference falls in the 100th year of the American Water Works Association. The conference will be preceded by a golf tournament and a tour of the MHD facility in Butte on the afternoon of March 25. A ladies' program will coincide with the regular Thursday and Friday conference schedule.

THE CONFERENCE SCHEDULE

Thursday, March 26

Morning -- Joint Session

8:00	Registration
9:00	Opening Ceremonies
9:45	Break
10:00	Business Meeting
11:00	Operator Training and In-Plant Conservation
12:00	Poolside Lunch and WPCF Report

Afternoon -- Session I

1:30	Package Water Treatment Plants (Dr. E. Robert Baumann, Iowa State Univ.)
2:15	Package Water Treatment Plants (Rick Jaccarino, Neptune Micro Flocc)
3:00	Break
3:15	A Design and Operation Diagram for Alum Coagulation (A. Amirtharajah, K.M. Mills and D. Sponheim)
4:00	External Corrosion Control (Dan Waters, Waters Consultants)
5:00	Adjourn
7:00	Buffet Dinner and Entertainment

Afternoon -- Session II

1:30	Realistic Sludge Production for Activated Sludge Plants Without Primary Clarifier (Kerwin L. Rakness, M&I Consulting Engineers)
2:15	Meeting Permit Requirements through Seasonal Discharge from Lagoons (Fritz Schwindt, North Dakota Dept. of Health)

The Big Sky Clearwater is published quarterly by the Water Quality Bureau of the state Department of Health and Environmental Sciences for water and wastewater treatment operators in Montana.

Editor -- Charles Wood

Graphics -- Erich Weber

Typist -- Betty Boeckel

3:00 Break
 3:15 Ozone Treatment (Jan Cranor, Water Quality Bureau, and
 Kerwin Rakness, M&I Consulting Engineers)
 4:00 A Panel on the Operation of Oxidation Ditches in Montana
 (moderated by Dr. Robert Sanks, MSU)
 5:00 Adjourn
 7:00 Buffet Dinner and Entertainment

Friday, March 27

Morning -- Session I

9:00 Stabilization of Water with Polyphosphates (John
 Lechner, Met-Pro Corp.)
 9:45 Break
 10:00 Equipment Application and General Maintenance
 Controls and Instruments (Mike Beven)
 Water Storage Tanks (Jeff Ellrich)
 Pump Repair and Maintenance (Gene Shima)
 Low Pressure Sewer Systems (Rob Balderson)
 12:00 Poolside Lunch and AWWA Report

Morning -- Session II

9:00 Safety Equipment for Sewer Maintenance Crews
 (Gordon Johnston, Henry's Safety Supply Co.)
 9:45 Break
 10:00 Film on Water Conservation
 Strong on Safety (Tom Decker, Black & Veatch)
 12:00 Poolside Lunch and AWWA Report

Afternoon -- Session I

1:30 Giardiasis and the Red Lodge Experience (Dayton
 Alsaker, Water Quality Bureau)
 2:15 Biofilm Growth and Its Effect on Stream Water
 Quality (Michael Rubich, A. Amirtharajah and
 S. Srinanthakumar)

Afternoon -- Session II

1:30 Flexible Conduits (George Heimel, Johns-Manville)
 2:15 Design of Small Public Water Systems (Jerry Burns,
 Water Quality Bureau)

Afternoon -- Joint Session

3:15 MWPCA and MSAWWA Business Meetings
 5:00 Adjourn
 7:00 Banquet, Awards and Dancing

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Ladies' program

Thursday, March 26

9:00 Coffee, juice and rolls at
Copper King Inn
11:00 Bus leaves for stop at
Berkeley Pit viewing stand
11:30 Tour of Copper King Mansion
12:30 Luncheon and entertainment
at Copper King Mansion
1:45 Bus leaves mansion for
uptown shopping or mineral
display at Montana Tech
2:45 Gymnastics performance at
Montana Tech P.E. Complex
3:30 Bus leaves Montana Tech,
picks up shoppers at Park
and Main and returns to
Copper King Inn
7:00 Buffet Dinner and enter-
tainment

Friday, March 27

9:00 Coffee, juice, rolls and
lapidary display (at 10:00)
at Copper King Inn
Noon Luncheon with men
1:30 Bus leaves for shopping
4:00 Return to Copper King Inn
on bus from Butte Plaza
4:30 Return to Inn from uptown
7:00 Banquet, Awards and dancing

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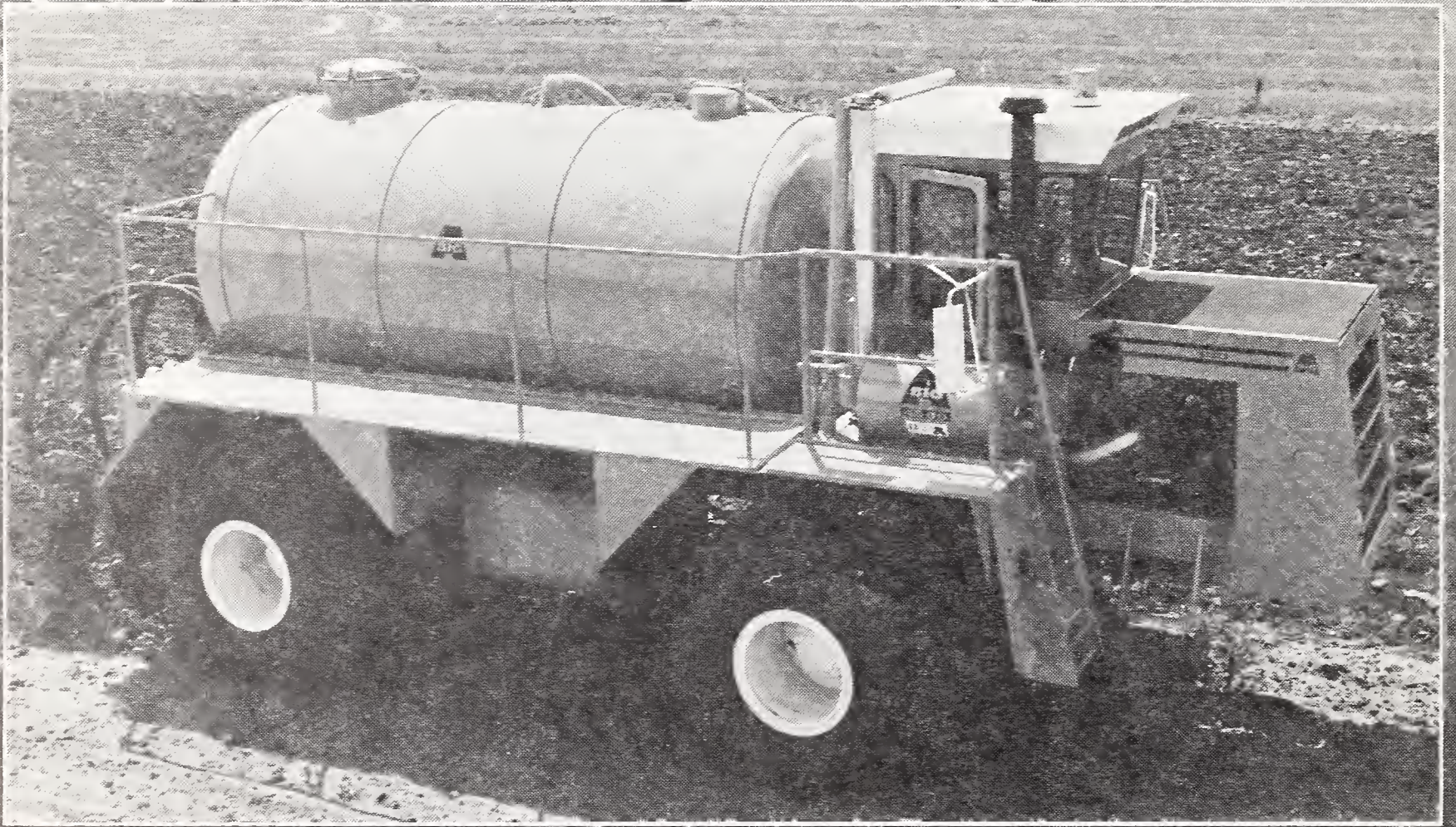
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Wind may power the Livingston plant

From the Billings Gazette

TOURISTS TRAVELLING on Interstate 90 en route to Yellowstone National Park next fall will get a first-hand look at a decentralized wind generating system if Ed Stern's dream comes true.

Stern, community development director for Livingston, is hoping to receive \$355,000 in grants from state and federal funds to construct a "windfarm" adjacent to Interstate 90 that would power the city's expanded sewage treatment plant now under construction.

A decision on the grants is expected within the next few months, and public



meetings are being held to discuss the merits of the project. Design and construction would follow and the windfarm could be operational by next fall, according to Stern.

Over the 20-year expected life of the system, it would generate nearly \$500,000 worth of electricity, enough to pay off construction costs and give a substantial cost saving to the city, Stern said.

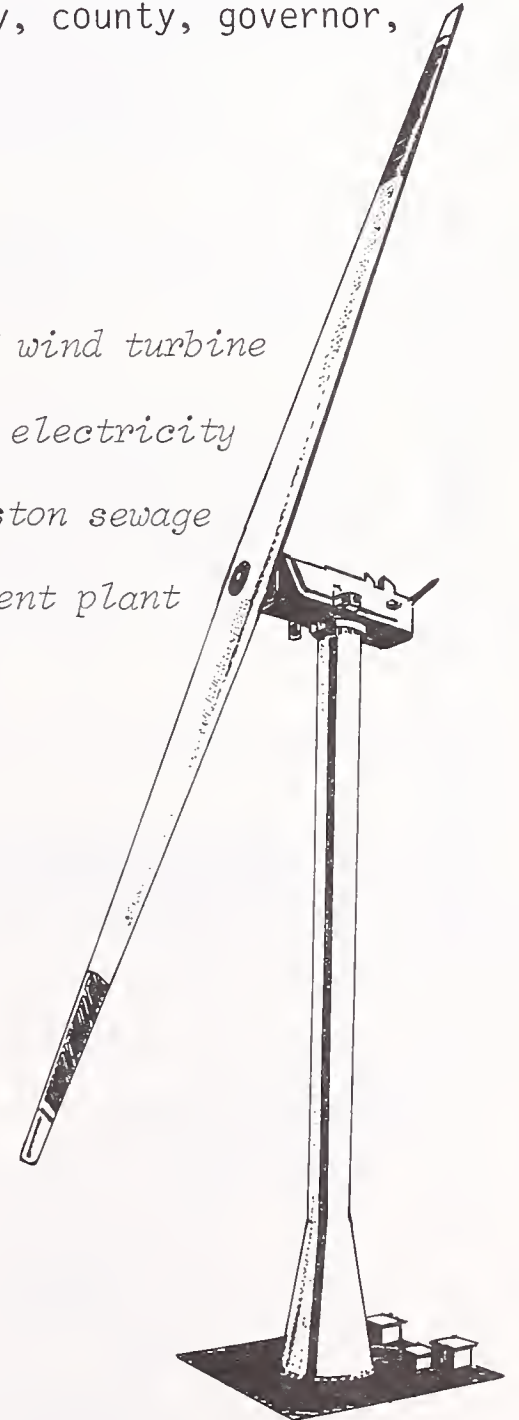
The windfarm will have eight small wind generators, each roughly as tall as a telephone pole, located in a cluster on the flats southeast of town. The generators will probably be identical to one installed six months ago by Montana Power Company less than one mile away.

But Jay Carter, whose company built MPC's 25 kilowatt generator, said his firm has been swamped with 150 orders for generators. Lead time for new orders is now 18 months, said Carter who was making modifications on the MPC generator last fall. He said there's no way he could supply eight generators next summer because of commitments to other customers.

Facing that timetable, windfarm project director Ed O'Hair said they may turn to another manufacturer, but would prefer to use Carter's model so they could draw from MPC's experience. Carter's generator costs \$17,000 at his Texas plant, plus delivery costs of \$5 per mile.

Support for the windfarm is widespread including the city, county, governor,

*The type of wind turbine
that may provide electricity
to the Livingston sewage
treatment plant*



congressional delegation and the Montana Energy & MHD Research and Development Institute which drew up the preliminary proposal.

Everyone associated with the project is confident the grants will be awarded due not only to the average yearly wind speed of 16 miles per hour, but these other key factors:

- MPC's functioning wind generator currently in operation nearby that could be a reference base.
- Designation as one of several sites by the federal government to receive a huge wind generator now under development that could supply one fourth of the city's electrical needs. A 170 foot tower was installed two months ago to obtain base-line data that is necessary before the project can begin.

That mammoth generator, at least two years away, would have a blade 260 feet long and cost in the neighborhood of \$3 million. It would be operated by MPC.

It is currently being developed with Department of Energy research funds, and will have a generating capacity of 3 or 4 megawatts, roughly 2 percent of Colstrip Unit One.

IF BOTH THE WINDFARM and the large generator projects are installed, it would be a side-by-side comparison of the "big is better" versus the "small is beautiful" approaches to wind generation.

But the two projects are not competitors.

The windfarm will have a power line routing electricity, valued at roughly \$20,000 a year depending on the rate used in calculations, to the sewage plant.

Power generated above the plant's needs would be sold back to MPC.

The Public Service Commission is about to set a power buy-back rate that MPC would credit the city for electricity supplied from the windfarm above the sewage plant's needs.

The windfarm "is not a demonstration project," said O'Hair, stressing it will be a cost-effective system feasible on its own merits.

Pete Antonioli, project manager for MPC, said MPC supports the windfarm project and will offer the city assistance and advice based on experience with their own generator close by.

Since it was installed last May, their 56-foot-tall generator with a 31-foot blade has only been working half the time due to electrical problems with a safety mechanism and very poor wind speeds. Wind speeds so far have been disappointingly low, Antonioli said.■

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Great Falls takes early look at trihalomethanes

Almost two years in advance of a federally required monitoring program, the City of Great Falls has begun testing local water for a special group of organic chemicals. Public Works Director Carl Abel in January told city commissioners that the first test shows Great Falls water has a low amount of the chemicals known as trihalomethanes. The level of the chemicals was about one-third of the allowable amount.

Chloroform is usually the trihalomethane found in the highest concentrations. The EPA considers chloroform to be a potential human carcinogen. Formation of trihalomethanes occurs when chlorine is added to water and combines with organic material in the water.

Great Falls will be tested on a quarterly basis. For community water systems serving 10,000 to 75,000 people, regular monitoring for the organic chemicals must begin by Nov. 29, 1982. Great Falls started early, Abel said, "so if there were any dangers, we'd know about it now." Fortunately, the first test shows the city to be "in good shape" as far as EPA regulation is concerned, he added.

Billings also has begun monitoring for trihalomethanes, but it serves more people and its required starting date already has arrived.

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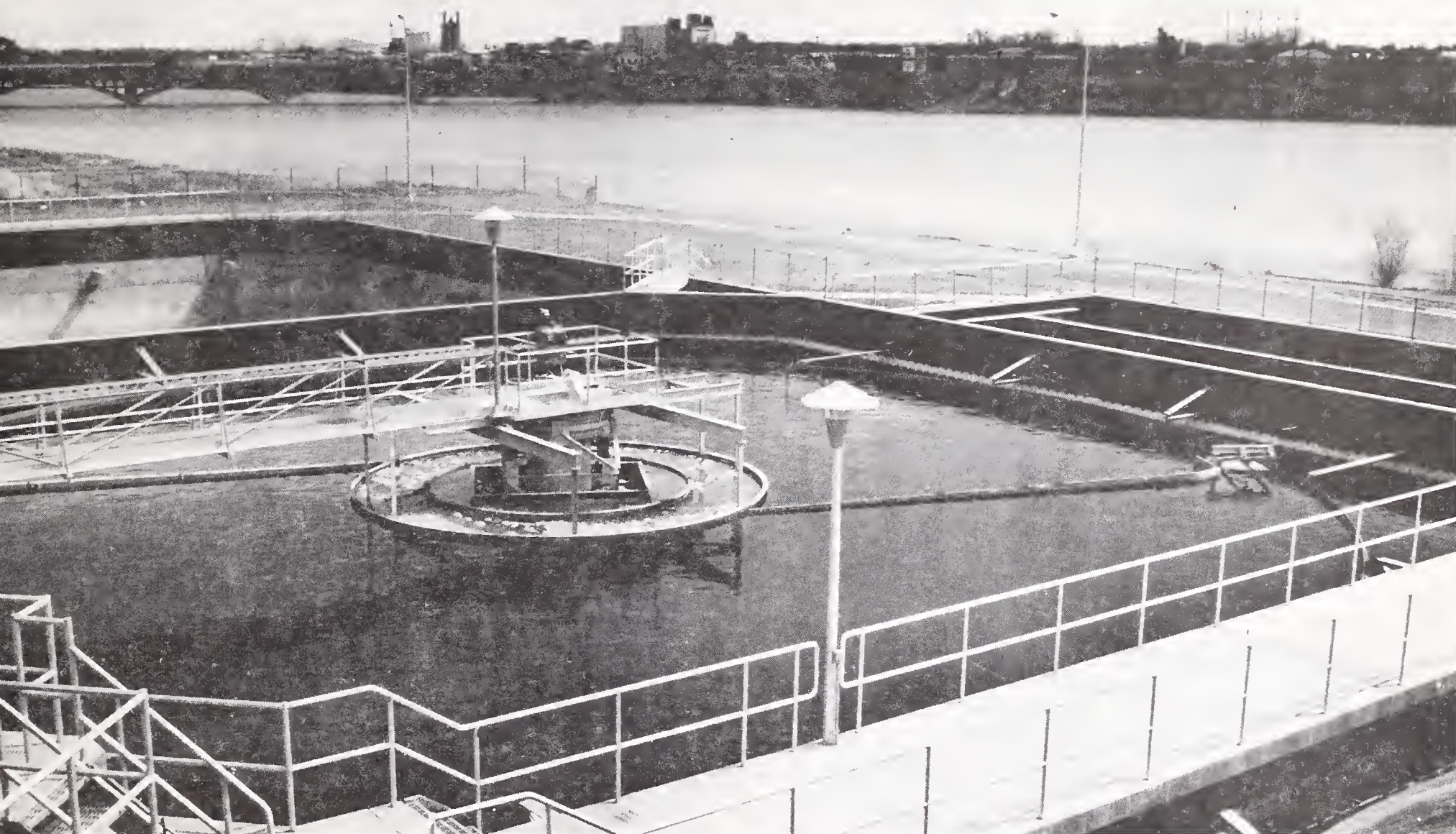
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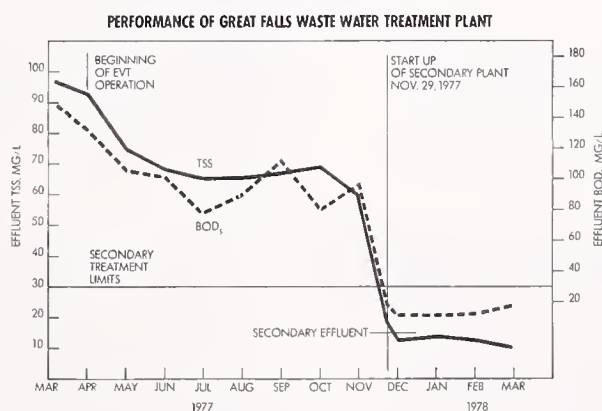
The arrangement frees the city of Great Falls from personnel problems, paperwork, special funding for training, and costly replacement and repair responsibilities. The taxpayers not only

save money, they have the assurance that they won't have to pay fines.

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Envirotech, Great Falls saved \$35,000 in the contract's first month alone. And, the plant was brought up to environmental water quality standards on the first day—in itself an almost unheard of performance.

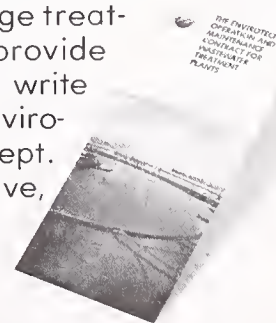
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The big poker game in Martin City

Water operator deals a mean hand: there'll be no flushes tonight

CAN YOU RAISE a town's dander by turning off its water? You bet.

In fact, authorities warned the owner of the Martin City water system that he'd better not show up in town -- for his own safety -- after he deliberately left 105 homes and businesses high and dry.

The water users of Martin City -- near the west entrance to Glacier National Park -- are used to having the water system shut down, it's had a long history of problems. But what the system's latest owner, Wes Johnson, did on the night of Dec. 16 had them outraged.

On that Tuesday, the Montana Public Service Commission notified Johnson at his home in Hot Springs that his request for a rate increase in Martin City was being denied. He then drove the 80 or so miles to Martin City and, that night, removed the control box containing the relays that operate the pumps on the system's three wells. And then he went back home to Hot Springs. By midnight, the 105 customers were without water for drinking, fire protection or sanitary use.

One mother said her 3-year-old son woke her at 3 a.m. and wanted a drink of water. That's when she found the water had been turned off.

After daybreak, residents found notices posted at the post office and the local grocery store saying, "Due to a lack of funds and statements by the Montana State Health Department that in their opinion the Martin City Water Company System is unsafe, we are forced to temporarily discontinue service." The notice was signed by Johnson, and suggested that citizens not call the local resident who was running the system for Johnson.

On Wednesday morning, a county tanker

truck was put into action to haul water to Martin City, especially to the Martin City school where 61 students were "coping" with the problem ("We've had lots of experience with being out of water," said one of the teachers).

The Flathead County Health Department shut down the Deerlick Saloon and the South Fork Bar. The Deerlick's owner said he was "thoroughly disgusted" by the situation. He said he could haul enough water to mix with a scotch but not enough to wash the dishes and continue operations.

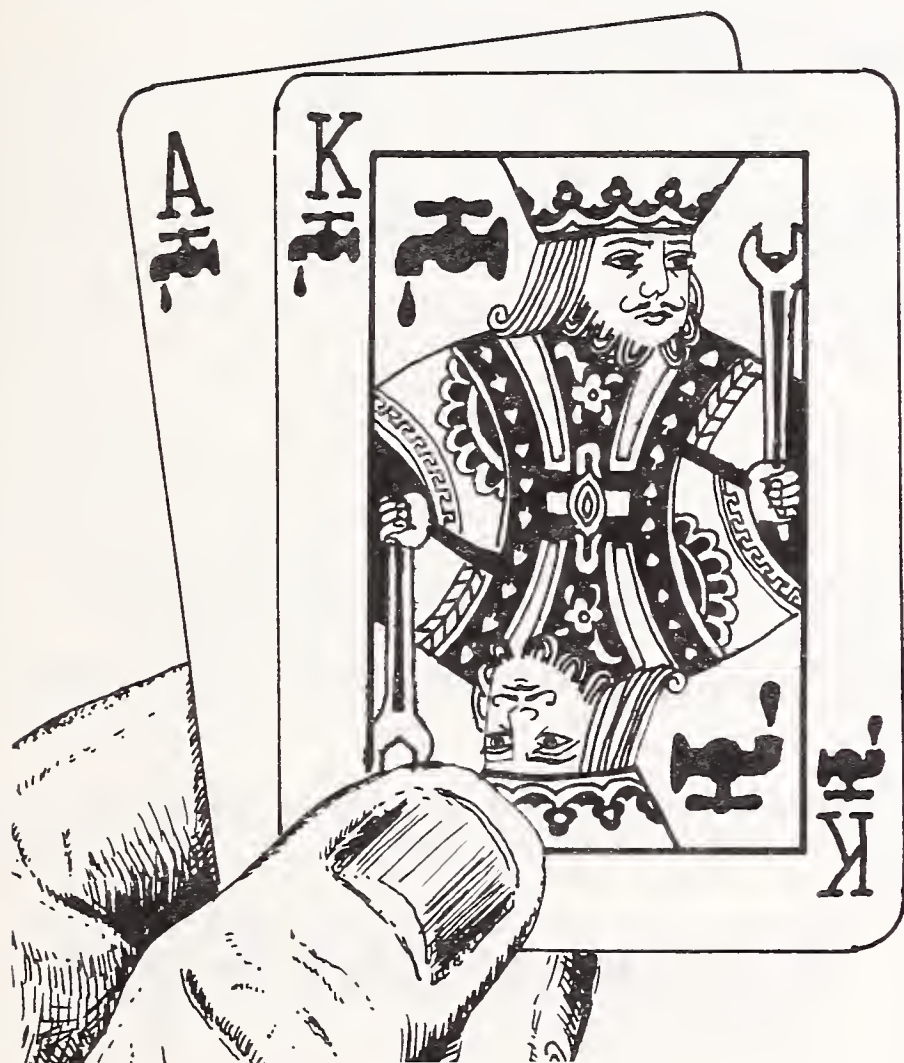
By mid-afternoon, a crew sent by the county had the water system back in operation. But not before the county had contacted the governor's office to say that an emergency situation existed. And tempers were so high in Martin City on that Wednesday that the Flathead County attorney suggested Johnson would be smart to stay out of town.

ON WEDNESDAY EVENING, Johnson told Kalispell's newspaper, the Daily Inter Lake, that he had removed the relays the night before after problems developed in the system that he felt could have contaminated the water. He said one pump had quit the week before, resulting in lower water pressure -- a condition which, on several occasions before, prompted warnings from Flathead County health officers about possible contamination from backflow. On Tuesday, he said, he was called by the system's maintenance man in Martin City about more problems in the pump relays. He claims he removed them and took them back to Hot Springs to repair.

The problems with the system did not originate with Johnson. The system was installed in 1949 when work started on Hungry Horse Dam. There were numerous complaints filed with the PSC and other officials when it was owned by Russ Baeth. However, officials who have dealt with both men say Baeth generally made an effort to correct the problems graciously.

By July, 1977, continuing problems and financial losses caused Baeth to petition

the PSC for permission to abandon the system. Local residents considered forming a water district until they were told about the many costly improvements they'd have to make. Johnson, who favored a district, offered to buy the system from Baeth and make the improvements himself. He bought the system for \$15,000 and was granted a rate increase by the PSC. But after he installed 15,000 feet of new



water line, residents were still complaining to the PSC that service hadn't improved.

Johnson had never contracted for an engineering design on the system. He did all the work himself, generally slip-jointing smaller diameter pipe into the old pipe. In a July 11, 1979, memo to the state Department of Health and Environmental Sciences, Will Aikin of the department's Water Quality Bureau branch office in Kalispell said: "He (Johnson) has cobbled this thing up to an alarming degree. . . . If it gets to the point that an engineering firm makes an evaluation for the new water district, preparatory to making a counter offer, they may find that very little of the existing system has any value whatsoever." When Aikin wrote this memo, Johnson's asking price for the system was \$100,000. Today the asking

price is about \$250,000 (Johnson claims to have invested \$270,000 in money and labor), but the district members say the system is worth only a fraction of what Johnson is asking.

Aikin said much of the frustration with trying to negotiate a transfer of the present system from Johnson to the new district had been Johnson's steadfast refusal to allow the district to examine the system. In fact, Aikin's July, 1979, memo contained an amazingly accurate prediction about events that were to occur a year-and-a-half later: "The situation has suddenly become a poker game in which Wes Johnson feels he has the community boxed in to the point where they will have to meet his asking price or no water."

"We could easily have a situation," Aikin's memo continued, "where. . . he'll just turn (the water) off, temporarily at least, to emphasize his point that poor as it is, they will have to meet his price or go without. . . . It's a worst-case scenario but all parties are emotionally high enough to do stupid things."

Dan Fraser, head of the Water Quality Bureau's drinking-water section, said this kind of situation is not unique to Martin City. "It's happened in a number of places around Montana," Fraser said, "where operators of small water systems run shoddy operations, providing poor service to their customers." The state is lacking in regulations to govern this sort of thing, Fraser said, "and there's not a lot we can do about it. Maybe the PSC can do something."

AT THE BIG SKY CLEARWATER'S press time, the Martin City water system had been put, by the county, back into Johnson's hands. On Jan. 9, all parties involved in the rhubarb agreed to bring in an outside engineer to help determine the system's value. On Feb. 4, the PSC gave Johnson permission to abandon the system on May 1; time enough, the PSC reasoned, for the two sides to come to an agreement on the transfer. But as March approached, they seemed as far apart as ever.

The poker game, as Aikin called it, continues. ■

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—Operator-training outlook—

Committee set up to develop statewide training program

A committee to develop a statewide training program for water and wastewater operators, among others, was organized at a conference near Helena on Feb. 10-11.

The Joint Training Coordinating Committee will identify training needs in Montana and then coordinate and promote training activities. Tim Hunter, the Water Quality Bureau staffer who coordinated the conference, said the original idea was to improve training just for Montana water and wastewater operators. But, he said, "We are expanding this committee to include all of those people involved in training for all environmental concerns. This will include such things as solid-waste management, pesticides, hazardous

materials, air quality, and so on."

The Montana committee is patterned after a nationwide committee set up in 1977 by the American Water Works Association, Association of Boards of Certification, Federation of Associations on the Canadian Environment and Water Pollution Control Federation. Similar committees have been established in California, Washington, Maryland, Nebraska, Utah and New Jersey.

The planning conference was sponsored by the Water Quality Bureau with an \$8,000 Clean Water Act grant from the EPA. Two more planning conferences will be held under the grant.


Montana working to obtain a training-facility grant

An EPA workshop was held in Dallas, Texas, on Jan. 15 concerning the federal assistance available for state wastewater operator training.

Section 109(b) of the Federal Water Pollution Control Act of 1972 and the amendments of 1977 authorize the allocation of up to \$500,000 of each state's construction-grants funds for the construction of a training facility.

Jan Cranor, Water Quality Bureau, and Martha Ann Dow, Northern Montana College, represented Montana at the workshop, which covered the application and acquisition process for the grant. Montana is evaluating operator training needs to determine the best use of the 109(b) funds. An advisory board will be established through the Joint Training Coordinating Committee (see previous story) to help plan and coordinate the activities.

Some possible uses of the grant money include: mobile training units, rental of existing classrooms or lab facilities, specialized instructors, construction of a resource center or a working treatment facility.



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Small town to get unique 'small-diameter' system

By Craig Brawner
WQB Sanitary Engineer

THE TOWN OF LINCOLN, which has always relied on septic tanks and drainfields, will before long have a wastewater collection and treatment system like no other in Montana.

Lincoln is a quiet, unincorporated community of about 850 people nestled in the Blackfoot River Valley about 60 miles northwest of Helena. Timber and recreation industries provide its heartbeat. But the septic tanks and drainfields have caused some palpitations by threatening Lincoln's groundwater supplies. Individual wells tap the groundwater found just three to six feet below most of the community. Concerns about groundwater pollution and public health problems spurred health officials to enforce county septic-tank regulations strictly. The result has been a near moratorium on development, since much of the Lincoln area cannot

meet the groundwater separation requirements for installation of conventional septic systems. In most cases, experimental or unconventional treatment systems were too expensive.

In June, 1979, Lewis and Clark County, on behalf of Lincoln, applied for and received an EPA grant to develop a facility plan. Stahly Engineering of Helena was selected to assess the community's current and future problems and develop a cost-effective solution. A thorough documentation of significant health hazards and failing septic systems was required before EPA would fund construction of a collection system.

The facility plan selected the unique treatment system -- one that exists in a very few places in the U.S. The sewer collection system -- called a "small-diameter gravity sewer" -- consists of 4 to 8-inch-diameter pipe which transports effluent from individual septic

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tanks. Normal sewers use a minimum pipe diameter of 8 inches, but the small-diameter sewer transports only the liquid portion of the sewage and, therefore, small pipes can be used.

Since most Lincoln residences have septic tanks, the small-diameter system is cheaper to install. The estimated total cost is \$2.8 million for the project. The septic tanks will need to be pumped out every two or three years. The collection system will transport the effluent to lagoons, storage ponds and rapid infiltration basins located outside Lin-

coln where the soils and groundwater levels provide adequate treatment of the wastes.

The proposed system is the least expensive solution to Lincoln's problems. And the community will save even more money since the EPA pays an extra 10% of the design and construction costs -- bringing the total up to 85% federal funding -- for such an innovative alternative. The treatment system has the added benefit of not discharging into the Blackfoot River.

New projects also approved for 13 other locations

In addition to the Lincoln project described above, there are \$18.5 million in wastewater collection and treatment improvements under way in 13 other Montana communities under the Construction Grants Program (projects that have been approved since the last project list was published in the Fall 1980 Issue of the Big Sky Clearwater). They are:

Roy

A \$516,000 project for design and construction of a sewage collection system and lagoon will also include land treatment via sprinkler irrigation.

Billings

The main Billings interceptor will be continued -- at a cost of \$11.3 million -- to relieve overloads on the sewer system in the main portion of the city. The project also provides capacity to handle the west side of Billings.

Sunburst

A \$461,000 project to design and construct a collection system and lagoons has been approved.

Missoula

A grant has been approved for the design of modifications to the sludge-handling facilities. Total project cost is \$169,000.

Three Forks

A \$1.2-million project will include the construction of lagoons followed by land treatment and rapid infiltration to eliminate the discharge of raw sewage into the Jefferson River.

Choteau

The design and construction of a creek crossing and a major sewage-system rehabilitation are part of a \$140,000 package to eliminate excessive infiltration from the Choteau system.

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Great Falls

A \$61,000 project to design the north-east interceptor has been approved. It will provide service to Malmstrom Air Force Base and the east side of Great Falls.

Geyser

A grant has been awarded for design and construction of a sewage collection system and lagoons, including land treatment via sprinkler irrigation. Total project cost will be about \$380,000.

Moore

Moore is also receiving a grant for design and construction of a sewage collection system, lagoons and land treatment via sprinkler irrigation. This project will cost about \$553,000.

Winnett

A \$129,000 project for construction of lagoon modifications and an additional aerated pond has been approved.

Warm Springs State Hospital

Because the collection system here is inundated with infiltration that can't be removed cost-effectively, approval has been given for design and construction of new aerated lagoons. Estimated cost of the project: \$2 million.

Polson

A \$1-million project is getting under way to construct aerated ponds and modify existing lift stations.

Ronan

A major rehabilitation of the existing sewage-collection system will be coupled with improvements in Ronan's treatment facility in this \$563,000 project.

Getting good mileage from water

Water is the best buy in Conrad, Montana. The town's new water treatment plant ended its first year of operation last October and records kept by Assistant Superintendent Steve Ruhl show that Conrad residents received water for an average of 9 gallons for one penny. Let's see Exxon and Perrier match that price.

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From the
Saskatchewan
Clear Water
Reporter

Hypochlorination

— should I use Calcium Hypochlorite or Sodium Hypochlorite?

In small water treatment plants where full-time skilled operators are not employed, the selection of the least expensive chemicals for disinfecting the municipal water supply is not always the best choice. Listed below are a few basic points regarding hypochlorites which may help you in deciding what form of chemical is best suited for you to use.

Calcium hypochlorite - 65%

Common names

- Chlorine powder;
- high test hypochlorite.

Facts

- 65 per cent available chlorine;
- available in powder or tablet form;
- available in 100 pound drums;
- cost is approximately \$130 per 100 pound drum.

Advantages

- in powdered form, the available chlorine content is higher than the liquid forms, therefore less chemical is needed to provide the same dosage rate;
- cheaper to use as compared to sodium hypochlorite.

Disadvantages

- must be mixed in a separate container, allowed to settle and then the clear liquid portion is syphoned into the feed container;
- regular cleaning of the chemical feeder and feed lines is required;
- must be handled with extreme caution, as the dust is harmful if swallowed and will irritate the eyes, nose, mouth, and skin;
- highly corrosive when wet.

Sodium hypochlorite - 12%

Common names

- Commercial strength sodium hypochlorite.

Facts

- 12 per cent available chlorine;
- available in a liquid form;
- available in five gallon plastic containers;
- cost is approximately \$12.50 per five gallon container.

Advantages

- less maintenance of the chemical feeder and feed lines is required;
- can be mixed and fed from the same drum.

Disadvantages

- much weaker than calcium hypochlorite, therefore a larger amount of chemical is required to obtain the same dosage rate;
- more expensive to use as compared to calcium hypochlorite;
- caution should be exercised when handling as it irritates skin and eyes;
- highly corrosive.

Sodium hypochlorite - 5%

Common names

- household bleach;
- liquid bleach.

Facts

- 5 per cent available chlorine;
- available in a liquid form;
- available in one gallon plastic containers;
- cost is approximately \$1.50 per gallon.

Advantages

- less maintenance of the chemical feeder and feed lines is required;
- can be mixed and fed from the same drum.

Disadvantages

- much weaker than calcium or 12% sodium hypochlorite, therefore a larger amount of chemical is required to obtain the same dosage rate;
- more expensive to use as compared to calcium or 12% sodium hypochlorite;
- caution should be exercised when handling as it irritates skin and eyes;
- highly corrosive.

Pumping station on history list

The Big Hole pumping station, built at Divide in 1899 to carry water to the Butte mining metropolis, has been listed in the National Register of Historic Places. The register is designed to promote preservation of historic properties, offering federal matching funds and tax advantages for preservation.

The pump station was built to end a critical water shortage in Butte, and was a pioneer effort in water-supply engineering. It carries water from the Big Hole River over the Continental Divide to reservoirs on Basin Creek.

Operator to help save a creek

Larry Longfellow, chief operator at Helena's wastewater treatment plant, has been named to an 11-member citizens' task force that will attempt to improve the water quality and recreation potential of Prickly Pear Creek near Helena. The task force is made up of present users of Prickly Pear water -- ranchers, irrigators, city officials, industrialists and sportsmen -- who are both contributors to and victims of the pollution in the creek. The Helena treatment plant is now contributing pollutants detrimental to fish in the lower end of the creek, a situation the City of Helena would like to correct.

Operators' Certification Corner

QUESTIONS

1. The DPD test is used to measure
 - (a) dissolved oxygen
 - (b) pH
 - (c) chlorine residual
 - (d) ammonia nitrogen
2. Aerobic decomposition of sewage by organisms results in the end products.
 - (a) methane and water
 - (b) methane and carbon dioxide
 - (c) hydrogen sulfide and carbon dioxide
 - (d) carbon dioxide and water
3. Green algae in a lagoon or stream will add oxygen during the day but not at night (True or False)
4. _____ can be used to control algae in a water supply holding reservoir.
5. In a water supply system, tastes and odors from phenolic compounds in the raw water are _____ by chlorination.
6. Which of the following water conditions would cause corrosion of metals in a water supply system?
 - (a) low dissolved oxygen
 - (b) high alkalinity
 - (c) low chlorine residual
 - (d) high dissolved carbon dioxide

ANSWERS

1. C
2. D
3. True
4. Copper Sulfate
5. increased
6. D

A film on land treatment

Under a congressional mandate, the EPA has been pressing publicly-owned treatment works to use land-treatment systems to reclaim and recycle municipal waste water. The federal government also is paying up to 85% of the cost of land-treatment systems.

To help you understand what is at stake and to have you see why some communities have decided to use land treatment, EPA funded a new motion picture about this alternative system. The half-hour, 16mm color film -- "Water Passages" -- examines the use of land treatment in five communities across the U.S.

The movie may be borrowed free of charge by writing: Modern Talking Picture Service, 500 Park St. North, St. Petersburg, Fla. 33709. Just tell them what day (and an alternate day) that you can show the picture.

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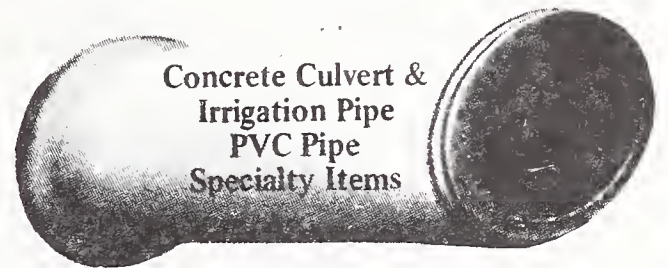
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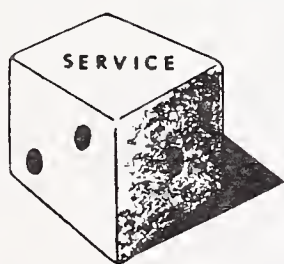
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